7th International Workshop on 2D Materials

Title of the Presentation: Tailoring the light-matter interaction in 2D materials

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Short Biography:

Dr. Xinfeng Liu, Professor, National Center for Nanoscience and Technology (NCNST), China. He received his Ph.D. from NCNST in 2011. He joined School of Physical and Mathematical Sciences of Nanyang Technological University (NTU), Singapore, as a postdoctoral research fellow. He joined the One Hundred Talents Program of the Chinese Academy of Sciences (CAS) in 2015. His research group focuses on light–matter interaction and ultrafast spectroscopy at micro to nanometer scale. In recent years, he has been published more than 170 peer-review papers in *Nat. Mater,. Nat. Commun., Adv. Mater., JACS, Nano Lett.* with total citations more than 11000 and H factor 51. He was the reviewer for *Nat. Nanotech., Science Adv., Adv. Mater., Nano Lett.* For more information, please refer to www.nanoctr.cn/liuxfgroup.

Abstract:

Understanding the formation and recombination dynamics between excitons and trions are critical for evaluating and improving the performance of two dimensional materials based optoelectronic devices. Herein, we have investigated the competitive luminescence processes of intralayer excitons and trions in WS_2/WSe_2 heterostructures with different (0°, 30° and 60°) twisted angles. We observed the increased photoluminescence (PL) ratio of trions compared to excitons in heterostructures with twisted angle of 30° and 60°. For twisted angle of 30°, the relatively large PL ratio of trions is caused by the high probability of trion formation than that of excitons. While for twisted angle of 60°, the ultrafast formation time of trions is the main reason for the trion-dominant proportion in the PL spectrum. Moreover, the power law between the excitation laser and the PL emission intensity reflects how the many-body effect affects the competition luminescence of excitons and trions. Our present results provide further understanding of the optical behaviors of intralayer excitons and trions in different twisted angle heterostructures.

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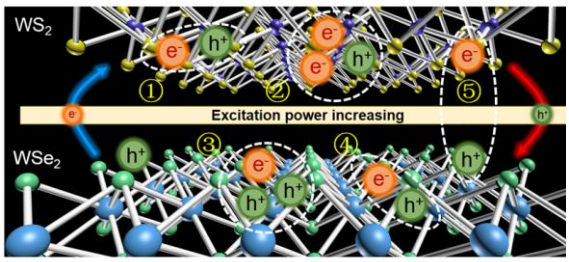

Fig. 1. The quasi-particles in WS_2/WSe_2 heterostructures